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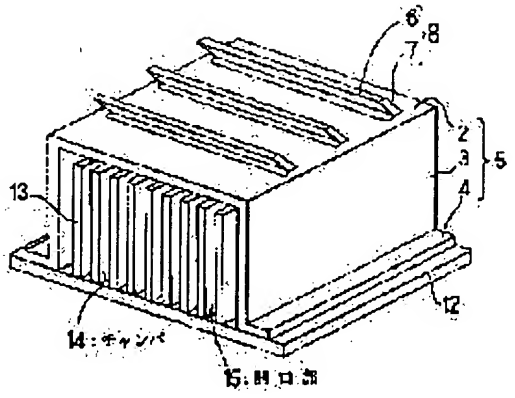
(54) COVER FOR HEAT SINK

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a cover for a heat sink by which the cooling capacity of the heat sink can be increased, without supplying a power newly from the outside.

SOLUTION: Three stripes of slit-like inlet holes, which are passed through so as to open both face side faces of them are formed in a top plate 2 at a cover for a heat sink, which is a box-shaped tunnel member of rectangular cross section. In addition, fluid guide plates 7 are installed respectively at edge parts on one side, along the long direction of the respective inlet holes on the surface of the top plate 2. Then, the cover for the heat sink is bonded to the heat sink in such a way that side plates 3 of the cover for the heat sink become parallel to fins 13 and that the fins 13 are inserted into and fitted to the inside of the main body part 5 of the cover for the heat sink.



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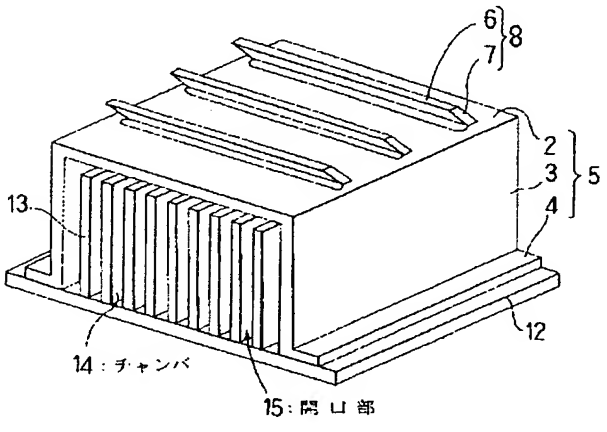
(54)【発明の名称】　ヒートシンク用カバー

(57)【要約】

【課題】　外部から新たに動力を供給することなく、ヒートシンクの冷却能力を増大させることのできるヒートシンク用カバーを提供する。

【解決手段】　断面が矩形である箱形トンネル状の部材であるヒートシンク用カバー１の天板２には、その両面側を開口するように貫通させたスリット状の導入孔７が一条設けられている。また、天板２の上面における各導入孔７の長手方向に沿う一方のエッジ部には、流体ガイド板８がそれぞれ設けられている。そして、ヒートシンク用カバー１の側板３がヒートシンク１１のフィン１３と平行になるように、かつヒートシンク用カバー１の本体部５の内部にフィン１３が挿嵌されるように、ヒートシンク用カバー１がヒートシンク１１に接合されている。



【特許請求の範囲】
【請求項1】　冷媒流体の流路に配置されてその冷媒流体との間で放熱をおこなう放熱部を備えたヒートシンクの外周側を覆うヒートシンク用カバーにおいて、
前記放熱部の外周側を覆いかつ前記冷媒流体の流路の上流側に向けて開口した開口部を有するトンネル状の本体部と、前記冷媒流体を本体部の内部に導き入れる導入部とを備えていることを特徴とするヒートシンク用カバー。
【請求項2】　前記導入部が、前記本体部に形成された内外面に貫通する導入孔であることを特徴とする請求項1に記載のヒートシンク用カバー。
【請求項3】　前記導入部が、前記本体部の内外面に貫通して形成された導入孔と、前記本体部の外面に突設されかつ前記本体部の外部の冷媒流体を前記導入孔に向けて導く流体ガイド板とからなることを特徴とする請求項1に記載されたヒートシンク用カバー。
【発明の詳細な説明】
【0001】
【発明の属する技術分野】この発明は、各種の熱交換機器や熱伝達装置等において熱交換面積を増大させるためのヒートシンクに設けられるヒートシンク用カバーに関するものである。
【0002】
【従来の技術】例えば、パソコン等のコンピュータの筐体内部にはCPU等の発熱源が種々設けられている。そして、これらの発熱源を効率よく冷却するために、これらの発熱源にヒートシンクを設けると共に、コンピュータの筐体にその外部から内部に空気を吸入する導入孔と、内部から外部に空気を排出する排出ファンとを設けることが従来行われている。このような構成であるコンピュータでは、排出ファンを回転させることによって導入孔からコンピュータの筐体内部に空気を導き、コンピュータの筐体内部を循環させる。そして、発熱源からヒートシンクに伝達された熱をヒートシンクから循環空気に放熱させ、それにより熱せられた空気を排出ファンによってコンピュータの筐体外部に排出させる。その結果、空気がその顕熱としてコンピュータの筐体内部の熱をその外部へ運び去るので、コンピュータ内部の発熱源を冷却することができる。
【0003】
【発明が解決しようとする課題】しかしながら、CPUに代表されるコンピュータ素子の高性能化が進むにつれて、それらの発熱量も増大する傾向にある。そのため、ヒートシンクによる放熱では冷却能力に限界があった。そのため、その冷却能力の限界を超えた熱がコンピュータ素子で発生すると、そのコンピュータ素子の温度上昇が顕著になり、遂には誤作動や焼損を惹起する可能性があった。
【0004】一方、コンピュータの筐体内部に循環空気を発生させるファンの送風能力を増大することにより冷却能力を増大することが考えられる。しかし、ファンの回転数を増大することによりその送風能力を増大させるには限界がある。また、ファンの径を大きくするにしても、ノートブック型のパソコンに代表されるいわゆる携帯型パソコン等にファンが設けられている場合では、ファンの径を大きくするには限界がある。さらに、ファンの回転数やその径を増大させ、ファンの送風能力を増大させたとしても、消費電力の増大や騒音の増大を惹起する可能性があった。
【0005】この発明は上記の事情を背景にしてなされたものであり、外部から新たに動力を供給することなく、ヒートシンクの冷却能力を増大させることのできるヒートシンク用カバーを提供することを目的とするものである。
【0006】
【課題を解決するための手段およびその作用】上記の目的を達成するために、請求項1に記載した発明は、冷媒流体の流路に配置されてその冷媒流体との間で放熱をおこなう放熱部を備えたヒートシンクの外周側を覆うヒートシンク用カバーにおいて、前記放熱部の外周側を覆いかつ前記冷媒流体の流路の上流側に向けて開口した開口部を有するトンネル状の本体部と、前記冷媒流体を本体部の内部に導き入れる導入部とを備えていることを特徴とするものである。
【0007】したがって、請求項1の発明において、本体部をヒートシンクの放熱部を覆うトンネル状に形成し、その本体部の内部に冷媒流体を導き入れる導入部を本体部に備えているので、より多くの冷媒流体を、ヒートシンク用カバーによって覆われているヒートシンクの放熱部に吹き付けることができる。そのため、外部から新たな動力を供給することなく、ヒートシンクの放熱量を増大させ、ヒートシンクの冷却能力を増大させることができる。
【0008】また、請求項2に記載した発明は、前記導入部が、前記本体部に形成された内外面に貫通する導入孔であることを特徴とするものである。
【0009】したがって、請求項2の発明において、冷媒流体をヒートシンク用カバーの本体部の内部に導き入れる導入部として、本体部の外壁部にその内外面を貫通する導入孔が設けられることによって、冷媒流体の流路での下流側に位置するヒートシンクの放熱部の箇所に対しても、ヒートシンク用カバーの本体部の外部を流動している加熱されていないいわゆる新鮮な冷媒流体を吹き付けることができる。その結果、ヒートシンクの放熱量をさらに増大させることができ、ヒートシンクの冷却能力をさらに増大させることができる。
【0010】さらに、請求項3に記載した発明は、前記導入部が、前記本体部の内外面に貫通して形成された導入孔と、前記本体部の外面に突設されかつ前記本体部の

外部の冷媒流体を前記導入孔に向けて導く流体ガイド板とからなることを特徴とするものである。

【００１１】したがって、請求項３の発明において、冷媒流体をヒートシンク用カバーの本体部の内部に導き入れる導入部として、本体部の外壁部にその内外面を貫通する導入孔と本体部の外面に突設させた流体ガイド板とを設けることによって、本体部の外部を流動する冷媒流体の流線を導入孔へ強制的に向けることができる。その結果、冷媒流体を導入孔に容易に導くことができる。

【００１２】

【発明の実施の形態】つぎに、この発明の具体例を図面に基づいて説明する。図１には、この発明におけるヒートシンク用カバーの一例が示されている。ここに示すヒートシンク用カバー１はアルミニウム（Ａ１）製であり、断面が矩形である箱形トンネル状の部材である。より詳細に説明すると、このヒートシンク用カバー１は矩形平板状の天板２と、その天板２の四つの辺のうち対向する二つの辺から垂直に延びた矩形平板状の左右の側板３と、各側板３の天板２とは反対側の下端部で互いに対向する内側面とは反対方向に直角に突設されたフランジ部４とから構成されている。なお、天板２と側板３とから本体部５を構成している。

【００１３】そして、天板２にはその表裏を両面側に開口するように貫通させた導入孔６が形成されている。これらの導入孔６は、図１の例では、前記側板３が延びている一方の側縁部から他方の側縁部に至るスリット状の孔であり、互いに平行に一定間隔をおいて形成されている。また、天板２の図１における上面における各導入孔６の長手方向に沿う一方の端部には、流体ガイド板７がそれぞれ設けられている。これらの流体ガイド板７は、ヒートシンク用カバー１の外部を流れる空気などの冷却媒体を導入孔６に導き入れるためのものであって、導入孔６の開口面とのなす角度が鋭角となるように天板２の上面に突出して設けられている。なお、導入孔６と流体ガイド板７とによって導入部８を構成している。図２は、導入孔６と流体ガイド板７との相対位置を示すための断面図である。

【００１４】図３には、上述のヒートシンク用カバー１が接合されるヒートシンクの一例が示されている。ここに示すヒートシンク１１はアルミニウム（Ａ１）や銅（Ｃｕ）あるいはそれらの合金などを素材とする金属製であり、平板状のベース１２と、そのベース１２から起立状態で複数枚設けられた放熱部である薄板状のフィン１３とから構成されている。なお、フィン１３の高さがヒートシンク用カバー１の側板３の高さとフランジ部４の厚さとの和、すなわちヒートシンク用カバー１の図１における高さ方向での内法以下になるようにフィン１３が形成されている。

【００１５】図４には、ヒートシンク用カバー１がヒートシンク１１に接合された状態を示されている。ヒートシンク用カバー１の側板３がヒートシンク１１のフィン１３と平行になるように、かつヒートシンク用カバー１の本体部５の内部にフィン１３が挿嵌されるように、ヒートシンク用カバー１がヒートシンク１１に接合されている。なお、ヒートシンク用カバー１のフランジ部４をヒートシンク１１のベース１２に溶接、接着、あるいはねじ止めすることにより、ヒートシンク用カバー１がヒートシンク１１に接合されている。そして、ヒートシンク１１のベース１２と、ヒートシンク用カバー１の天板２と側板３とからチャンバ１４が形成される。したがって、そのチャンバ１４は、フィン１３の端部側で開口する開口部１５を備えたトンネル状のものである。

【００１６】次に、ヒートシンク用カバー１が接合されたヒートシンク１１をノートブック型パソコンのＣＰＵ（中央演算処理装置）に取り付けた具体例を示す。図５に示すノートブック型パソコン２１は、従来知られたものとほぼ同様に、パソコン本体２２がプラスチックパネルあるいはマグネシウム合金等の金属パネルによって形成された比較的厚さの薄い矩形容器からなり、ＪＩＳ（日本工業規格）でのＡ５～Ａ４サイズ程度の大きさをなしている。そして、パソコン本体２２の上面部には、キーボード２３が嵌め込み等の手段によって取り付けられている。さらに、パソコン本体２２の一端部にある回動軸を中心として、ディスプレイ２４が回動可能にパソコン本体２２に取り付けられている。

【００１７】また、パソコン本体２２の内部での底面には、発熱源であるＣＰＵ２５が設けられている。そして、図６に示すように、パソコン本体２２の側壁部２６の一つには、空気取入孔２７と空気排出ファン２８とが設けられている。そして、空気取入孔２７から取り入れられかつ空気排出ファン２８から排出される空気の流路がＣＰＵ２５を通過するように形成される。

【００１８】さらに、ＣＰＵ２５の上面には、ヒートパイプ３１が熱伝達可能に取り付けられている。図７に示すように、このヒートパイプ３１は、金属製の中空偏平状のコンテナ３２を備えている。このコンテナ３２は、正方形の面を有した加熱部３３と、この加熱部３３と対向するように離隔し、その加熱部３３よりも面積の広い正方形の面を有した放熱部３４と、これら加熱部３３の四辺と放熱部３４の四辺とをそれぞれ連結する台形の面を有した四つの傾斜側壁部３５とによって構成されている。なお、ヒートパイプ３１の加熱部３３がＣＰＵ２５と熱伝達可能に取り付けられている。さらに、コンテナ３２の内部には、図示しない作動流体が封入されている。

【００１９】また、図８は放熱部３４を取り除いた状態でのヒートパイプ３１の平面図である。加熱部３３の内面と四つの傾斜側壁部３５の内面には、グルーブからなるウィック３６が設けられている。このウィック３６は、加熱部３３では格子状に配列されており、傾斜側壁

部35では放熱部34と加熱部33とを直線で結ぶように配列されている。このウィック36は毛細管力によって液相の作動流体を放熱部34から加熱部33に還流させる作用をなす。

【0020】そして、そのヒートパイプ31の放熱部34には、ヒートシンク11のベース12が、その底面を密着させて熱伝達可能に取り付けられている。なお、ヒートシンク11およびこれに取り付けたヒートシンク用カバー1の向きは、フィン13が冷媒流体である空気の流線とほぼ平行となり、かつその空気流の上流側に向けて流体ガイド板7が傾倒する向きに設定されている。

【0021】そして、上記のように構成されたこの発明の作用について説明する。ノートブック型パソコン21が作動すると、CPU25が作動し発熱する。そして、その発生した熱はヒートパイプ31の加熱部33に伝達する。さらに、その熱によって加熱部33に存在する図示しない作動流体が加熱され、蒸発する。その蒸発した作動流体が放熱部34に流動し、そこで放熱した後凝縮する。そして、凝縮した作動流体が直接加熱部33へ滴下、あるいはウィック36によって加熱部33に還流する。

【0022】また、ヒートパイプ31の放熱部31に伝達された熱は、ヒートシンク11のベース12に伝達され、さらにその一部はフィン13やヒートシンク用カバー1に伝達される。そして、ベース12やフィン13やヒートシンク用カバー1に伝達された熱は、そこからヒートシンク11やヒートシンク用カバー1の近傍を流動する空気に放熱される。

【0023】ところで、冷媒流体としてパソコン本体22の内部を流動する空気は、空気排出ファン28によって、空気取入孔27から取り入れられ、ヒートシンク11の近傍を流動する。そして、ヒートシンク11やヒートシンク用カバー1から熱を奪って、空気排出ファン28から排出される。

【0024】図9はCPU25とヒートパイプ31とヒートシンク11とヒートシンク用カバー1との、フィン13と平行な方向における断面図である。ヒートシンク11に向けて流動してきた空気は、その一部が開口部15からチャンバ14に流入する。また、ヒートシンク用カバー1の天板2よりも図9における上方を流動する空気は、その一部が流体ガイド板7によって導入孔6に誘導され、強制的に導入孔6からチャンバ14に流入する。

【0025】このように、ヒートシンク用カバー1に導入孔6と流体ガイド板7とを設けることによって、冷媒流体である空気を、それらを設けない場合と比較してより多くチャンバ11に流入させることができる。その結果、放熱手段であるフィン13の近傍を流れる空気の量が多くなるため、外部から新たな動力を供給しなくとも、ヒートシンク11の放熱量を増大することができる。すなわち、ヒートシンク11の冷却能力を増大させることができる。換言すれば、ヒートシンク11から離れた箇所を流動してしまい冷却の用に供されない空気の量を少なくすることができるので、装置全体としての冷却効率を向上させることができる。

【0026】また、空気の流路での下流側に位置するフィン13の箇所の近傍では、導入孔6と流体ガイド板7とを設けない場合、その箇所よりも空気の流路での上流側に位置するフィン13の箇所から放熱されることにより熱せられた空気が流動している。そのため、空気の流路での下流側に位置するフィン13の箇所では、周辺の空気との温度差が小さくなることにより、放熱量がその箇所よりも空気の流路での上流側に位置するフィン13の箇所の放熱量よりも少なくなる。しかし、上記の導入孔6と流体ガイド板7とを設けることによって、空気の流路での下流側に位置するフィン13の箇所に対しても、ヒートシンク用カバー1の本体部5の外部を流動している加熱されていないいわゆる新鮮な空気を吹き付けることができるので、ヒートシンク11の放熱量をさらに増大することができる。その結果、ヒートシンク11の冷却能力をさらに増大させることができる。

【0027】図10はこの発明の他の具体例を示している。なお、上述の具体例と同様の構成である部材には、上述の具体例と同じ番号を付しその説明を省略する。図10に示すヒートシンク用カバー41は、その本体部42とフランジ部43とが図1に示すヒートシンク用カバー1の本体部5とフランジ部1とそれぞれ同様の構成をもったものである。

【0028】また、ヒートシンク用カバー41の導入部44として、天板2の両面側に開口するように貫通させた楕円状の導入孔15が複数設けられている。なお、導入孔45は、その長軸方向では、その長軸が側板3の延びる天板2の辺と平行になる状態で二つ設けられている。また、導入孔15は、その短軸方向では、ヒートシンク11のフィン13の間隙の幅だけ間隔をおいて設けられている。

【0029】さらに、ヒートシンク用カバー11の側板3がヒートシンク11のフィン13と平行になるように、かつヒートシンク用カバー41の本体部42の内部にフィン13が挿嵌されるように、かつ導入孔15の下方にはフィン13の間隙が位置するように、ヒートシンク用カバー41がヒートシンク11に接合されている。そして、ヒートシンク11のベース12と、ヒートシンク用カバー11の天板2と側板3とからチャンバ46が形成される。したがって、そのチャンバ46はフィン13の端部側で開口する開口部17を備えたトンネル状のものである。

【0030】次に、ヒートシンク用カバー41が接合されたヒートシンク11をノートブック型パソコン21のCPU25に取り付けた具体例を示す。図11に示すよ

うに、CPU25に近接しているパソコン本体22の側壁部26の一つには、空気排出ファン28が設けられており、その側壁部26の一つに隣接している二つの側壁部26にはそれぞれ空気取入孔27が設けられている。そして、空気取入孔27から取り入れられ、かつ空気排出ファン28から排出される空気の流路がCPU25を通過するように形成される。

【0031】なお、上述の具体例と同様にヒートパイプ31がCPU25の上面に熱伝達可能に取り付けられている。そして、そのヒートパイプ31の放熱部34には、ヒートシンク11のベース12が、その底面を密着させて熱伝達可能に取り付けられている。また、チャンバ46と空気排出ファン28とを連通するダクト48が設けられている。

【0032】そして、上記のように構成されたこの発明の作用について説明する。CPU25から発生した熱がヒートパイプ31の放熱部34に伝達される過程は上述の具体例と同様なので説明を省略する。ヒートパイプ31の放熱部34に伝達された熱は、ヒートシンク11のベース12に伝達され、さらにその一部はフィン13やヒートシンク用カバー41に伝達される。そして、ベース12やフィン13やヒートシンク用カバー41に伝達された熱は、そこからヒートシンク11やヒートシンク用カバー41の近傍を流動する空気に放熱される。

【0033】ところで、冷媒流体としてパソコン本体22の内部を流動する空気は、空気排出ファン28によって、空気取入孔27から取り入れられ、ヒートシンク11の近傍を流動する。そして、ヒートシンク11やヒートシンク用カバー41から熱を奪って、ダクト48を介して空気排出ファン28から排出される。

【0034】図12はCPU25とヒートパイプ31とヒートシンク11とヒートシンク用カバー41とダクト48との、フィン13と平行な方向における断面図である。ヒートシンク11に向けて流動してきた空気は、その一部が開口部47からチャンバ46に流入する。また、空気排出ファン28が回転することにより、チャンバ46の内部の気圧がその外部の気圧よりも小さくなるので、ヒートシンク用カバー41の天板2よりも上方を流動する空気が導入孔45から吸入され、チャンバ46に流入する。

【0035】このように、ヒートシンク用カバー41に導入孔45を設け、チャンバ46内部の気圧を小さくすることによって、冷媒流体である空気を、導入孔45を設けない場合と比較してより多くチャンバ46に流入させることができる。その結果、放熱手段であるフィン13の近傍を流れる空気の量が多くなるため、外部から新たな動力を供給しなくとも、ヒートシンク11の放熱量を増大することができる。すなわち、ヒートシンク11の冷却能力を増大させることができる。換言すれば、ヒートシンク11から離れた箇所を流動してしまい冷却の用に供されない空気の量を少なくすることができるので、装置全体としての冷却効率を向上させることができる。

【0036】また、空気の流路での下流側に位置するフィン13の箇所の近傍では、導入孔45を設けない場合、その箇所よりも空気の流路での上流側に位置するフィン13の箇所から放熱されることにより熱せられた空気が流動している。そのため、空気の流路での下流側に位置するフィン13の箇所では、周辺の空気との温度差が小さくなることにより、放熱量がその箇所よりも空気の流路での上流側に位置するフィン13の箇所の放熱量よりも少なくなる。しかし、上記の導入孔45を設け、チャンバ46の内部の気圧をその外部の気圧よりも小さくすることによって、空気の流路での下流側に位置するフィン13の箇所に対しても、ヒートシンク用カバー41の本体部42の外部を流動している加熱されていないいわゆる新鮮な空気を吹き付けることができるので、ヒートシンク11の放熱量をさらに増大することができる。その結果、ヒートシンク11の冷却能力をさらに増大させることができる。

【0037】なお、上記各具体例では、ヒートシンク用カバーの上方を流動する冷媒流体である空気を、ヒートシンク用カバーとヒートシンクによって形成されるチャンバの内部に流動させる手段として、導入孔と流体ガイド板とを設ける例と、導入孔を設けると共にチャンバ内部の気圧をその外部の気圧よりも小さくする例とを示したが、この発明はこれに限定されるものではなく、他の手段を用いることによってヒートシンク用カバーの外部を流動する空気をチャンバの内部に流動させてもよい。

【0038】また、上記各具体例では、冷媒流体である空気をチャンバ内に導入する手段である導入孔や流体ガイド板をヒートシンク用カバーの天板に設けたが、この発明はこれに限定されるものではなく、ヒートシンク用カバーの側板に設けてもよい。

【0039】さらに、上記各具体例では、ヒートシンク用カバーの材質としてアルミニウム（Al）を用いたが、この発明はこれに限定されず、銅（Cu）等の金属でもよく、また耐熱性を有する合成樹脂を用いることもできる。

【0040】そして、上記各具体例では、ヒートシンク用カバーの形状として断面が矩形である箱形トンネル状のものを用いたが、この発明はこれに限定されず、断面が半円形である箱形トンネル状のものや断面が三角形である箱形トンネル状のものでもよい。また、管状のものでもよい。

【0041】また、上記各具体例では、冷媒流体として空気を用いたが、この発明はこれに限定されるものではなく、他の気体でもよいし、液体でもよい。

【0042】さらに、上記各具体例では、ヒートシンクとして薄板状のフィンを備えたものを用いたが、この発

明はこれに限定されるものではなく、コルゲート状のフィン等を採用することができる

【００４３】そして、上記各具体例では、この発明のヒートシンク用カバーをパソコンのＣＰＵを冷却するヒートシンクに用いたが、この発明はこれに限定されるものではなく、パソコン内部のＣＰＵ以外の発熱体にも使用することができ、さらにワークステーションやサーバー等の内部の発熱体にも使用することができる

【００４４】

【発明の効果】以上説明したように、この発明のヒートシンク用カバーによれば、本体部をヒートシンクの放熱部を覆うトンネル状に形成し、その本体部の内部に冷媒流体を導き入れる導入部を本体部に備えているので、より多くの冷媒流体を、ヒートシンク用カバーによって覆われているヒートシンクの放熱部に吹き付けることができる。そのため、外部から新たな動力を供給することなく、ヒートシンクの放熱量を増大させ、ヒートシンクの冷却能力を増大させることができる

【００４５】また、冷媒流体をヒートシンク用カバーの本体部の内部に導き入れる導入部として、本体部の外壁部にその内外面を貫通する導入孔が設けられることによって、冷媒流体の流路での下流側に位置するヒートシンクの放熱部の箇所に対しても、ヒートシンク用カバーの本体部の外部を流動している加熱されていないいわゆる新鮮な冷媒流体を吹き付けることができる。その結果、ヒートシンクの放熱量をさらに増大させることができ、ヒートシンクの冷却能力をさらに増大させることができる。

【００４６】さらに、冷媒流体をヒートシンク用カバーの本体部の内部に導き入れる導入部として、本体部の外壁部にその内外面を貫通する導入孔と本体部の外面に突設させた流体ガイド板とを設けることによって、本体部の外部を流動する冷媒流体の流線を導入孔へ強制的に向けることができる　その結果、冷媒流体を導入孔に容易に導くことができる

【図面の簡単な説明】

【図１】　この発明のヒートシンク用カバーの一具体例を示す斜視図である。

【図２】　そのヒートシンク用カバーの断面図である。

【図３】　ヒートシンクを示す斜視図である。

【図４】　ヒートシンク用カバーが接合されたヒートシンクを示す斜視図である。

【図５】　ノートブック型パソコンを示す模式図である。

【図６】　その平面図である。

【図７】　ヒートパイプを示す斜視図である。

【図８】　その平面図である

【図９】　ＣＰＵとヒートパイプとヒートシンクとヒートシンク用カバーとを示す断面図である。

【図１０】　この発明のヒートシンク用カバーの他の具体例を示す斜視図である。

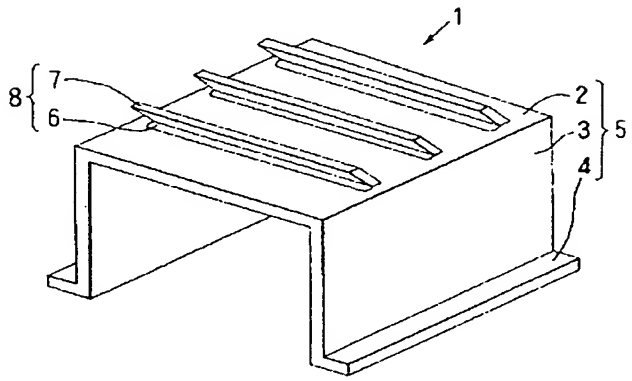
【図１１】　ノートブック型パソコンを示す平面図である。

【図１２】　ＣＰＵとヒートパイプとヒートシンクとヒートシンク用カバーとを示す断面図である。

【符号の説明】

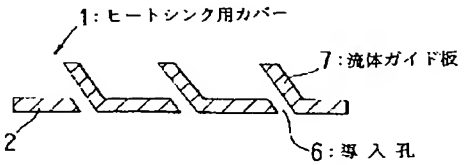
１，４１…ヒートシンク用カバー、　２…天板、　５，４２…本体部、　６，４５…導入孔、　７…流体ガイド板、　８，４１…導入部、　１１…ヒートシンク、　１３…フィン、　１４，４６…チャンバ、　１５，４７…開口部、　２１…ノートブック型パソコン、　２２…パソコン本体、　２５…ＣＰＵ、　２７…空気取入孔、　２８…空気排出ファン、　３１…ヒートパイプ、　１８…ダクト。

【図１】

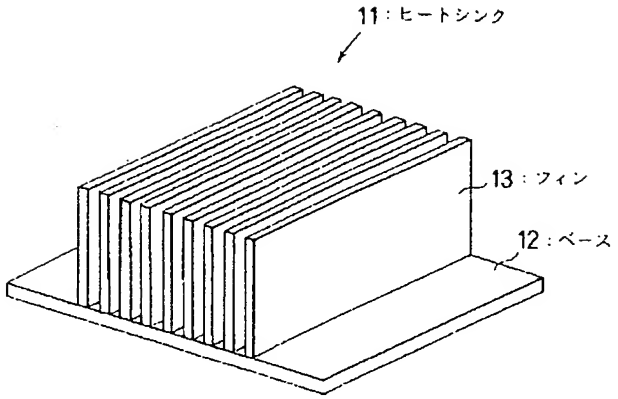


1：ヒートシンク用カバー　　7：流体ガイド板
5：本体部　　8：導入部
6：導入孔

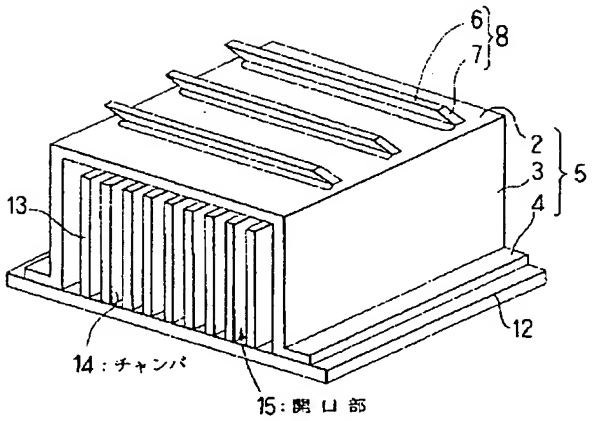
【図２】



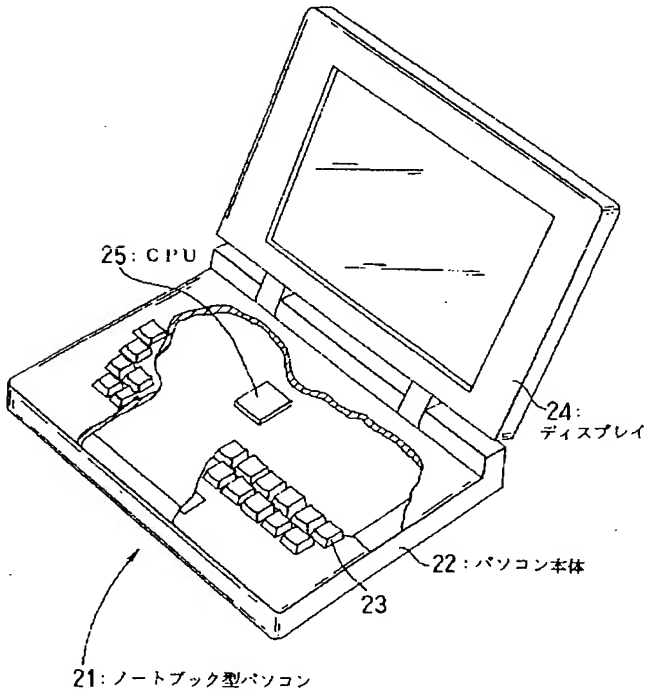
【図3】



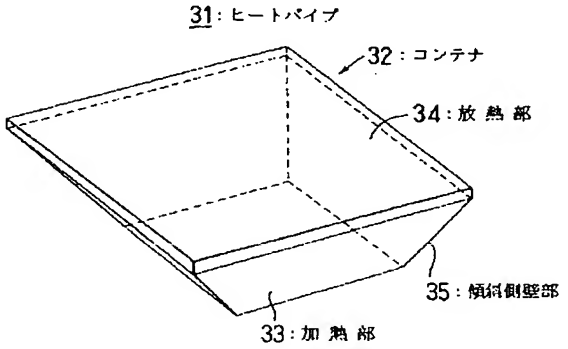
【図4】



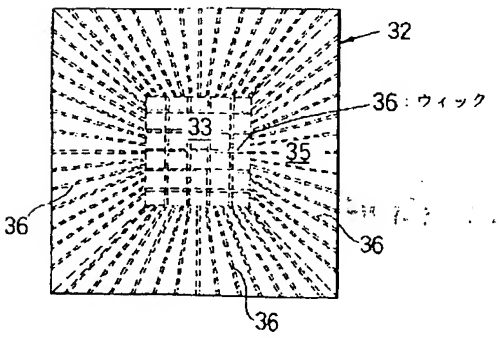
【図5】



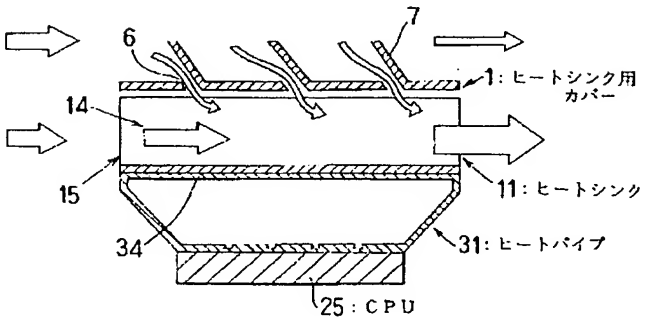
【図7】



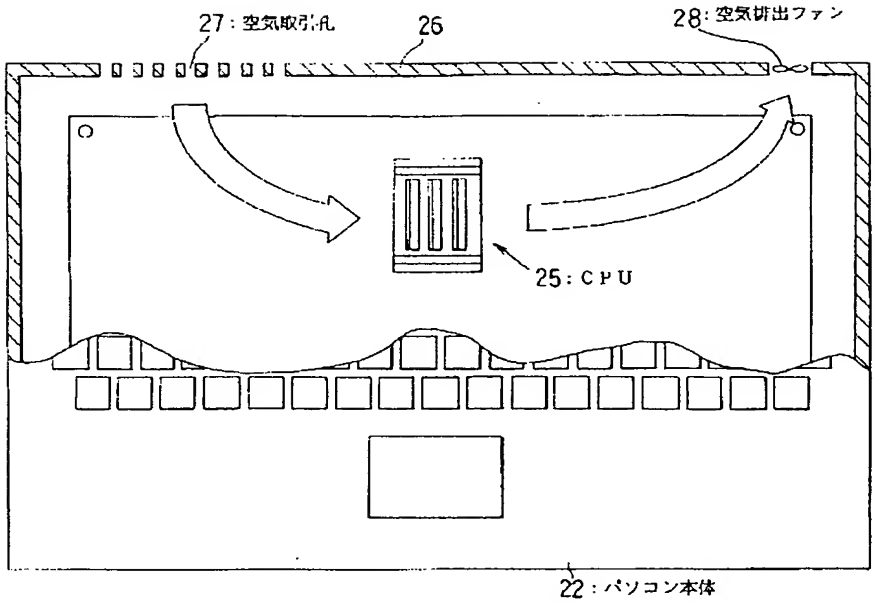
【図8】



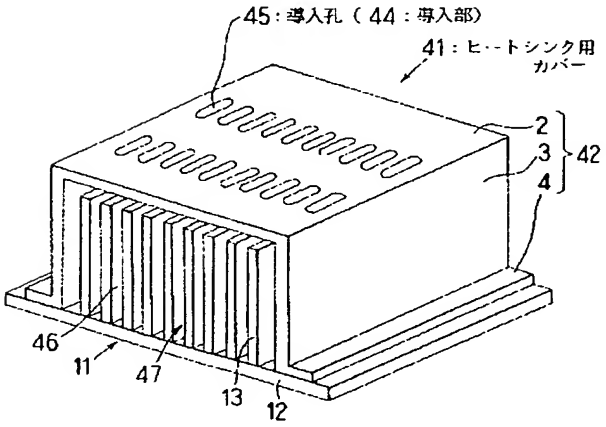
【図9】



【図6】

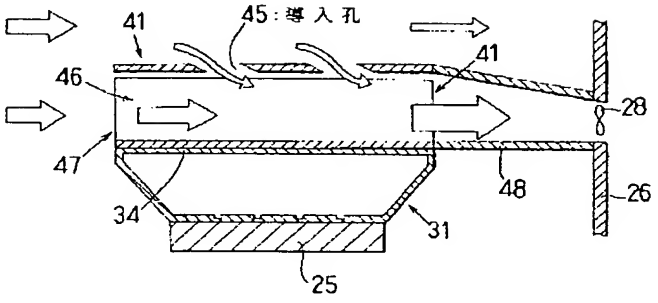


【図10】

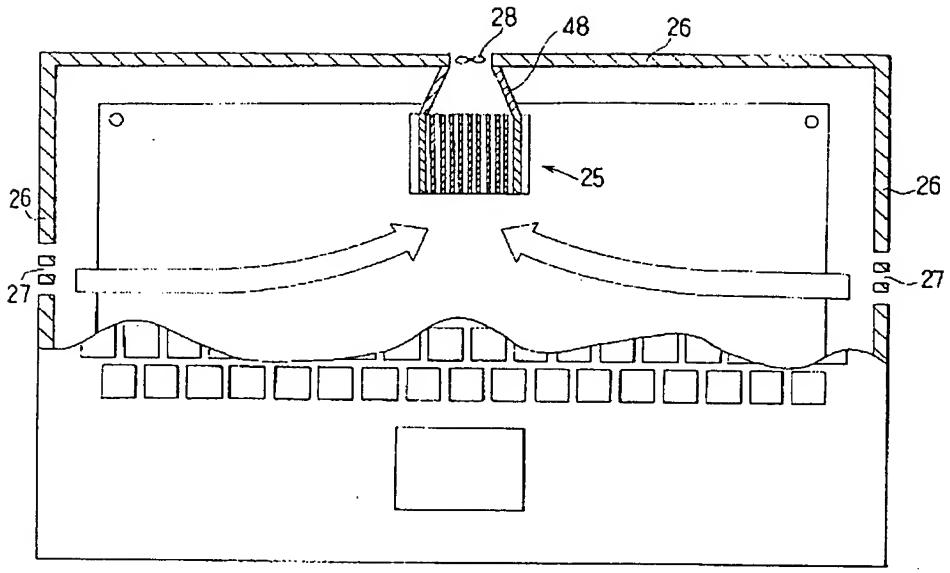


11：ヒートシンク　46：チャンバ　47：開口部

【図12】



【図11】



フロントページの続き

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* NOTICES *

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CLAIMS

[Claim(s)]
[Claim 1] Covering for heat sinks characterized by to have the body section of the shape of a tunnel which has opening which covered the periphery side of said radiator and carried out opening of the periphery side of the heat sink equipped with the radiator which is arranged in the passage of a refrigerant fluid and radiates heat between the refrigerant fluid towards the upstream of the passage of said refrigerant fluid in covering for wrap heat sinks, and the induction which leads said refrigerant fluid to the interior of the body section.
[Claim 2] Covering for heat sinks according to claim 1 characterized by being the introductory hole which said induction penetrates to the inside-and-outside side formed in said body section.
[Claim 3] Covering for heat sinks indicated by claim 1 characterized by consisting of a fluid guide plate by which said induction protrudes on the introductory hole formed in the inside-and-outside side of said body section by penetrating, and the external surface of said body section, and turns and leads the refrigerant fluid of the exterior of said body section to said introductory hole.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to covering for heat sinks prepared in the heat sink for increasing heat exchange area in various kinds of heat exchange devices, heat transfer units, etc.
[0002]
[Description of the Prior Art] For example, sources of generation of heat, such as CPU, are variously established in the interior of the case of computers, such as a personal computer. And in order to cool these sources of generation of heat efficiently, while preparing a heat sink in these sources of generation of heat, preparing outside the discharge fan who discharges air is conventionally performed to the case of a computer from the introductory hole which inhales air from the outside to the interior, and the interior. By computer which is such a configuration, by rotating a discharge fan, air is led to the interior of the case of a computer from an introductory hole, and the interior of a case of a computer is circulated. And the heat transmitted to the heat sink from the source of generation of heat is made to radiate heat from a heat sink to a recirculating air, and the case exterior of a computer is made to discharge the air heated by that cause by the discharge fan. Consequently, since air carries away the heat inside the case of a computer to the exterior as the sensible heat, the source of generation of heat inside a computer can be cooled.
[0003]
[Problem(s) to be Solved by the Invention] However, it is in the inclination for those calorific value to also increase as high performance-ization of the computer component represented by CPU progresses. Therefore, in heat dissipation by the heat sink, the limitation was in refrigeration capacity. Therefore, when the heat beyond the limitation of the refrigeration capacity occurred with the computer component, the temperature rise of the computer component may have become remarkable, and **** actuation and burning may have been caused at last.
[0004] It is possible to increase refrigeration capacity by on the other hand increasing the ventilation capacity of the fan who generates a recirculating air inside the case of a computer. However, there is a limitation in increasing the ventilation capacity by increasing a fan's rotational frequency. Moreover, even if it enlarges a fan's path, there is a limitation in enlarging a fan's path in the case where the fan is prepared in the so-called portable personal computer represented by the personal computer of a notebook mold. Furthermore, though a fan's rotational frequency and its path were increased and a fan's ventilation capacity was increased, increase of power consumption and increase of the noise may have been caused.
[0005] It aims at offering covering for heat sinks which can increase the refrigeration capacity of a heat sink, without this invention making the above-mentioned situation a background, making it, and newly supplying power from the outside.
[0006]
[Means for Solving the Problem and its Function] In order to attain the above-mentioned purpose, invention indicated to claim 1 The periphery side of the heat sink equipped with the radiator which is

arranged in the passage of a refrigerant fluid and radiates heat between the refrigerant fluid is set to covering for wrap heat sinks. It is characterized by having the body section of the shape of a tunnel which has opening which covered the periphery side of said radiator and carried out opening towards the upstream of the passage of said refrigerant fluid, and the induction which leads said refrigerant fluid to the interior of the body section.

[0007] Therefore, in invention of claim 1, the radiator of a heat sink is formed for the body section in the shape of a wrap tunnel, and since the body section is equipped with the induction which leads a refrigerant fluid to the interior of the body section, more refrigerant fluids can be sprayed on the radiator of the heat sink covered with covering for heat sinks. Therefore, without supplying new power from the outside, the heat release of a heat sink can be increased and the refrigeration capacity of a heat sink can be increased.

[0008] Moreover, invention indicated to claim 2 is characterized by being the introductory hole which said induction penetrates to the inside-and-outside side formed in said body section.

[0009] In invention of claim 2, as induction which leads a refrigerant fluid to the interior of the body section of covering for heat sinks, in the outer wall section of the body section therefore, among those, by preparing the introductory hole which penetrates external surface the exterior of the body section of covering for heat sinks is flowed also to the part of the radiator of the heat sink located in the downstream in the passage of a refrigerant fluid -- the so-called fresh refrigerant fluid which is not heated can be sprayed. Consequently, the heat release of a heat sink can be increased further and the refrigeration capacity of a heat sink can be increased further.

[0010] Furthermore, invention indicated to claim 3 is characterized by consisting of a fluid guide plate by which said induction protrudes on the introductory hole formed in the inside-and-outside side of said body section by penetrating, and the external surface of said body section, and turns and leads the refrigerant fluid of the exterior of said body section to said introductory hole.

[0011] Therefore, in invention of claim 3, the elementary stream of the refrigerant fluid which flows the exterior of the body section can be compulsorily turned to an introductory hole by preparing the introductory hole which penetrates the inside-and-outside side in the outer wall section of the body section, and the fluid guide plate made to protrude on the external surface of the body section as induction which leads a refrigerant fluid to the interior of the body section of covering for heat sinks. Consequently, a refrigerant fluid can be easily led to an introductory hole.

[0012]

[Embodiment of the Invention] Below, the example of this invention is explained based on a drawing. An example of covering for heat sinks in this invention is shown in drawing 1 . The covering 1 for heat sinks shown here is the member of the shape of a cube type tunnel whose cross section it is a product made from aluminum (aluminum), and is a rectangle. If it explains to a detail more, this covering 1 for heat sinks consists of flanges 4 to which the medial surface which the side plate 3 of the rectangle plate-like right and left perpendicularly prolonged from the two sides which counter among the four sides of a rectangle plate-like a top plate 2 and a top plate 2', and the top plate 2 of each side plate 3 counter mutually in the lower limit section of the opposite side protruded on the right angle in the opposite direction. In addition, the body section 5 consists of a top plate 2 and a side plate 3.

[0013] And the introductory hole 6 which the top plate 2 was made to penetrate so that opening of the front flesh side may be carried out to both-sides side is formed. In the example of drawing 1 , said side plate 3 is a slit-like hole from the side edge section to [while is prolonged and] the side edge section of another side, sets fixed spacing in parallel mutually, and these introductory holes 6 are formed. Moreover, while meets the longitudinal direction of each introductory hole 6 in the top face in drawing 1 of a top plate 2, and the fluid guide plate 7 is formed in the edge, respectively. These fluid guide plates 7 are for leading cooling media, such as air which flows the exterior of the covering 1 for heat sinks, to the introductory hole 6, and they are projected and prepared in the top face of a top plate 2 so that the include angle with the effective area of the introductory hole 6 to make may serve as an acute angle. In addition, the introductory hole 6 and the fluid guide plate 7 constitute induction 8. Drawing 2 is a sectional view to show the relative position of the introductory hole 6 and the fluid guide plate 7.

[0014] An example of the heat sink to which the above-mentioned covering 1 for heat sinks is joined is shown in drawing 3 . The heat sink 11 shown here is metal made from aluminum (aluminum), copper (Cu) or those alloys, etc., and consists of the plate-like base 12 and a fin 13 of the shape of sheet metal which is the radiator formed two or more sheets in the state of standing up from the base 12. In addition, the fin 13 is formed so that the height of a fin 13 may become below the sum of the height of the side plate 3 of the covering 1 for heat sinks, and the thickness of a flange 4, i.e., the inside distance in the height direction in drawing 1 of the covering 1 for heat sinks.
[0015] The condition that the covering 1 for heat sinks was joined to the heat sink 11 is shown in drawing 4 . The covering 1 for heat sinks is joined to the heat sink 11 so that the side plate 3 of the covering 1 for heat sinks may become parallel to the fin 13 of a heat sink 11, and so that a fin 13 may be fitted in the interior of the body section 5 of the covering 1 for heat sinks. In addition, the covering 1 for heat sinks is joined to the heat sink 11 by welding, pasting up or ****ing and carrying out the stop of the flange 4 of the covering 1 for heat sinks to the base 12 of a heat sink 11. And a chamber 14 is formed from the base 12 of a heat sink 11, the top plate 2 of the covering 1 for heat sinks, and a side plate 3. Therefore, the chamber 14 is the thing of the shape of a tunnel equipped with the opening 15 which carries out opening by the edge side of a fin 13.
[0016] Next, the example which attached in CPU (arithmetic and program control) of a book type personal computer the heat sink 11 to which the covering 1 for heat sinks was joined is shown. The body 22 of a personal computer consists of a rectangle container with comparatively thin thickness formed by metal panels, such as a plastics panel or a Magnesium alloy, almost like what was known conventionally, and the book type personal computer 21 shown in drawing 5 is making the magnitude of A5 in JIS (Japanese Industrial Standards) - A4 size extent. And the keyboard 23 is attached in the top-face section of the body 22 of a personal computer by means, such as insertion. Furthermore, the display 24 is attached in the body 22 of a personal computer rotatable centering on the rotation shaft in the end section of the body 22 of a personal computer.
[0017] Moreover, CPU25 which is a source of generation of heat is formed in the base inside the body 22 of a personal computer. And as shown in drawing 6 , the air breathing hole 27 and the air discharge fan 28 are formed in one of the side-attachment-wall sections 26 of the body 22 of a personal computer. And it is formed so that the passage of the air which is adopted from the air breathing hole 27, and is discharged by the air discharge fan 28 may pass CPU25.
[0018] Furthermore, the heat pipe 31 is attached in the top face of CPU25 possible [heat transfer]. As shown in drawing 7 , this heat pipe 31 is equipped with the container 32 of the shape of hollow flat [metal]. This container 32 is isolated so that it may counter with the heating unit 33 with a square field, and this heating unit 33, and it is constituted by the four inclination side-attachment-wall sections 35 with the trapezoid field which connects the radiator 34 with the field of a square with an area larger than that heating unit 33, and the neighborhood of these heating units 33 and the neighborhood of a radiator 34, respectively. In addition, the heating unit 33 of a heat pipe 31 is attached possible [CPU25 and heat transfer]. Furthermore, the working fluid which is not illustrated is enclosed with the interior of a container 32.
[0019] Moreover, drawing 8 is the top view of the heat pipe 31 in the condition of having removed the radiator 34. The wick 36 which consists of a groove is formed in the inside of a heating unit 33, and the inside of the four inclination side-attachment-wall sections 35. By the heating unit 33, this wick 36 is arranged in the shape of a grid, and it is arranged so that a radiator 34 and a heating unit 33 may be connected with the inclination side-attachment-wall section 35 in a straight line. This wick 36 makes the operation which makes the working fluid of the liquid phase flow back from a radiator 34 to a heating unit 33 according to the capillary tube force.
[0020] And the base 12 of a heat sink 11 sticks the base to the radiator 34 of the heat pipe 31, and is attached in it possible [heat transfer]. In addition, the sense of the covering 1 for heat sinks attached in a heat sink 11 and this is set as the sense which a fin 13 becomes almost parallel to the elementary stream of the air which is a refrigerant fluid, and the fluid guide plate 7 concentrates towards the upstream of the airstream.

[0021] And an operation of this invention constituted as mentioned above is explained. If a book type personal computer 21 operates, CPU25 will operate and generate heat. And the generated heat is transmitted to the heating unit 33 of a heat pipe 31. Furthermore, with the heat, the working fluid which exists in a heating unit 33 and which is not illustrated is heated, and it evaporates. It condenses, after the working fluid which evaporated flows to a radiator 34 and radiates heat there. And the condensed working fluid flows back to a heating unit 33 by dropping or the wick 36 to the direct heating unit 33.
[0022] Moreover, the heat transmitted to the radiator 34 of a heat pipe 31 is transmitted to the base 12 of a heat sink 11, and the part is further transmitted to a fin 13 or the covering 1 for heat sinks. And the heat transmitted to the base 12, a fin 13, or the covering 1 for heat sinks radiates heat to the air which flows near a heat sink 11 or the covering 1 for heat sinks from there.
[0023] By the way, the air which flows the interior of the body 22 of a personal computer as a refrigerant fluid is adopted by the air discharge fan 28 from the air breathing hole 27, and flows near the heat sink 11 by him. And heat is taken from a heat sink 11 or the covering 1 for heat sinks, and it is discharged by the air discharge fan 28.
[0024] Drawing 9 is a sectional view in a direction parallel to the fin 13 of CPU25, a heat pipe 31, a heat sink 11, and the covering 1 for heat sinks. A part of the air which has flowed towards a heat sink 11 flows into a chamber 14 from opening 15. Moreover, the part is guided to the introductory hole 6 by the fluid guide plate 7, and the air which flows the upper part in drawing 9 rather than the top plate 2 of the covering 1 for heat sinks flows into a chamber 14 from the introductory hole 6 compulsorily.
[0025] Thus, the air which is a refrigerant fluid can be made to flow into a chamber 14 more mostly as compared with the case where they are not prepared, by forming the introductory hole 6 and the fluid guide plate 7 in the covering 1 for heat sinks. Consequently, since the amount of the air which flows near the fin 13 which is a heat dissipation means increases, even if it does not supply new power from the outside, the heat release of a heat sink 11 can be increased. That is, the refrigeration capacity of a heat sink 11 can be increased. If it puts in another way, since the amount of the air with which flows the part distant from the heat sink 11, and the business of cooling is not presented can be lessened, the cooling effectiveness as the whole equipment can be raised.
[0026] Moreover, when not forming the introductory hole 6 and the fluid guide plate 7 near the part of the fin 13 located in the downstream in the passage of air, the air heated by radiating heat from the part of the fin 13 located in the upstream in the passage of air rather than the part is flowing. Therefore, in the part of the fin 13 located in the downstream in the passage of air, when a temperature gradient with surrounding air becomes small, heat release becomes less than the heat release of the part of a fin 13 located in the upstream in the passage of air rather than the part. However, since the so-called fresh air which is flowing the exterior of the body section 5 of the covering 1 for heat sinks and which is not heated can be sprayed also to the part of the fin 13 located in the downstream in the passage of air by preparing the above-mentioned introductory hole 6 and the above-mentioned fluid guide plate 7, the heat release of a heat sink 11 can be increased further. Consequently, the refrigeration capacity of a heat sink 11 can be increased further.
[0027] Drawing 10 shows other examples of this invention. In addition, the number same to the member which is the same configuration as an above-mentioned example as an above-mentioned example is attached, and the explanation is omitted. The covering 41 for heat sinks shown in drawing 10 has the configuration as the body section 5 of the covering 1 for heat sinks and the flange 4 which are shown in drawing 1 with the respectively same body section 42 and flange 43.
[0028] Moreover, two or more introductory holes 45 of the shape of an ellipse made to penetrate as induction 44 of the covering 41 for heat sinks so that opening may be carried out to both-sides side of a top plate 2 are formed. In addition, the introductory hole 45 is formed in the direction of a major axis in the two condition that the major axis becomes the side of a top plate 2 and parallel to which a side plate 3 extends. Moreover, in the direction of a minor axis, only the width of face of the gap of the fin 13 of a heat sink 11 sets spacing, and the introductory hole 45 is formed.
[0029] Furthermore, the covering 41 for heat sinks is joined to the heat sink 11 so that a fin 13 may be fitted in the interior of the body section 42 of the covering 41 for heat sinks, and so that [so that the side

plate 3 of the covering 41 for heat sinks may become parallel to the fin 13 of a heat sink 11, and] the gap of a fin 13 may be located under the introductory hole 45. And a chamber 46 is formed from the base 12 of a heat sink 11, the top plate 2 of the covering 41 for heat sinks, and a side plate 3. Therefore, the chamber 46 is the thing of the shape of a tunnel equipped with the opening 47 which carries out opening by the edge side of a fin 13.

[0030] Next, the example which attached in CPU25 of a book type personal computer 21 the heat sink 11 to which the covering 41 for heat sinks was joined is shown. As shown in drawing 11 , the air discharge fan 28 is formed in one of the side-attachment-wall sections 26 of the body 22 of a personal computer close to CPU25, and the air breathing hole 27 is formed in the two side-attachment-wall sections 26 which adjoin one of the side-attachment-wall section 26 of the, respectively. And it is formed so that the passage of the air which is adopted from the air breathing hole 27, and is discharged by the air discharge fan 28 may pass CPU25.

[0031] In addition, the heat pipe 31 is attached in the top face of CPU25 possible [heat transfer] like the above-mentioned example. And the base 12 of a heat sink 11 sticks the base to the radiator 34 of the heat pipe 31, and is attached in it possible [heat transfer]. Moreover, the duct 48 which opens a chamber 46 and the air discharge fan 28 for free passage is formed.

[0032] And an operation of this invention constituted as mentioned above is explained. Since the process in which the heat generated from CPU25 is transmitted to the radiator 34 of a heat pipe 31 is the same as an above-mentioned example, explanation is omitted. The heat transmitted to the radiator 34 of a heat pipe 31 is transmitted to the base 12 of a heat sink 11, and the part is further transmitted to a fin 13 or the covering 41 for heat sinks. And the heat transmitted to the base 12, a fin 13, or the covering 41 for heat sinks radiates heat to the air which flows near a heat sink 11 or the covering 41 for heat sinks from there.

[0033] By the way, the air which flows the interior of the body 22 of a personal computer as a refrigerant fluid is adopted by the air discharge fan 28 from the air breathing hole 27, and flows near the heat sink 11 by him. And heat is taken from a heat sink 11 or the covering 41 for heat sinks, and it is discharged by the air discharge fan 28 through a duct 48.

[0034] Drawing 12 is a sectional view in a direction parallel to the fin 13 of CPU25, a heat pipe 31, a heat sink 11, the covering 41 for heat sinks, and a duct 48. A part of the air which has flowed towards a heat sink 11 flows into a chamber 46 from opening 47. Moreover, since the atmospheric pressure inside a chamber 46 becomes smaller than the atmospheric pressure of the exterior when the air discharge fan 28 rotates, the air which flows the upper part rather than the top plate 2 of the covering 41 for heat sinks is inhaled from the introductory hole 45, and flows into a chamber 46.

[0035] Thus, the air which is a refrigerant fluid can be made to flow into a chamber 46 more mostly as compared with the case where the introductory hole 45 is not formed, by forming the introductory hole 45 in the covering 41 for heat sinks, and making the atmospheric pressure of the chamber 46 interior small. Consequently, since the amount of the air which flows near the fin 13 which is a heat dissipation means increases, even if it does not supply new power from the outside, the heat release of a heat sink 11 can be increased. That is, the refrigeration capacity of a heat sink 11 can be increased. If it puts in another way, since the amount of the air with which flows the part distant from the heat sink 11, and the business of cooling is not presented can be lessened, the cooling effectiveness as the whole equipment can be raised.

[0036] Moreover, when not forming the introductory hole 45 near the part of the fin 13 located in the downstream in the passage of air, the air heated by radiating heat from the part of the fin 13 located in the upstream in the passage of air rather than the part is flowing. Therefore, in the part of the fin 13 located in the downstream in the passage of air, when a temperature gradient with surrounding air becomes small, heat release becomes less than the heat release of the part of a fin 13 located in the upstream in the passage of air rather than the part. However, since the so-called fresh air which is flowing the exterior of the body section 42 of the covering 41 for heat sinks and which is not heated can be sprayed also to the part of the fin 13 located in the downstream in the passage of air by forming the above-mentioned introductory hole 45 and making the atmospheric pressure inside a chamber 46 smaller

than the atmospheric pressure of the exterior, the heat release of a heat sink 11 can be increased further. Consequently, the refrigeration capacity of a heat sink 11 can be increased further.
[0037] in addition, by each above-mentioned example, the air which is the refrigerant fluid which flows the upper part of covering for heat sinks as a means to make the interior of the chamber formed with covering for heat sinks, and a heat sink flow Although the example which prepares an introductory hole and a fluid guide plate, and the example which makes the atmospheric pressure inside a chamber smaller than the atmospheric pressure of the exterior while preparing an introductory hole were shown This invention is not limited to this and may make the air which flows the exterior of covering for heat sinks flow inside a chamber by using other means.
[0038] Moreover, although the introductory hole and fluid guide plate which are a means to introduce in a chamber the air which is a refrigerant fluid were prepared in the top plate of covering for heat sinks by each above-mentioned example, this invention is not limited to this and may be prepared in the side plate of covering for heat sinks.
[0039] Furthermore, by each above-mentioned example, although aluminum (aluminum) was used as the quality of the material of covering for heat sinks, this invention is not limited to this but can also use the synthetic resin which metals, such as copper (Cu), are sufficient as, and has thermal resistance.
[0040] And although the thing of the shape of a cube type tunnel whose cross section is a rectangle as a configuration of covering for heat sinks was used by each above-mentioned example, this invention may not be limited to this but the thing of the shape of a cube type tunnel whose thing and cross section of the shape of a cube type tunnel whose cross section is a hemicycle are a triangle may be used for it. Moreover, a tubing-like thing may be used.
[0041] Moreover, although air was used as a refrigerant fluid by each above-mentioned example, this invention may not be limited to this, other gases are sufficient as it, and a liquid is sufficient as it.
[0042] Furthermore, although what was equipped with the sheet metal-like fin as a heat sink was used by each above-mentioned example, this invention is not limited to this and can adopt a corrugated fin etc.
[0043] And although covering for heat sinks of this invention was used for the heat sink which cools CPU of a personal computer by each above-mentioned example, this invention is not limited to this, can be used also for heating elements other than CPU inside a personal computer, and can be further used also for the heating element of the interior, such as a workstation and a server.
[0044]
[Effect of the Invention] Since the body section is equipped with the induction which forms the radiator of a heat sink for the body section in the shape of a wrap tunnel, and leads a refrigerant fluid to the interior of that body section according to covering for heat sinks of this invention as explained above, more refrigerant fluids can be sprayed on the radiator of the heat sink covered with covering for heat sinks. Therefore, without supplying new power from the outside, the heat release of a heat sink can be increased and the refrigeration capacity of a heat sink can be increased.
[0045] moreover -- as the induction which leads a refrigerant fluid to the interior of the body section of covering for heat sinks -- the outer wall section of the body section -- among those, the exterior of the body section of covering for heat sinks is flowed by preparing the introductory hole which penetrates external surface also to the part of the radiator of the heat sink located in the downstream in the passage of a refrigerant fluid -- the so-called fresh refrigerant fluid which is not heated can be sprayed. Consequently, the heat release of a heat sink can be increased further and the refrigeration capacity of a heat sink can be increased further.
[0046] Furthermore, the elementary stream of the refrigerant fluid which flows the exterior of the body section can be compulsorily turned to an introductory hole by preparing the introductory hole which penetrates the inside-and-outside side in the outer wall section of the body section, and the fluid guide plate made to protrude on the external surface of the body section as induction which leads a refrigerant fluid to the interior of the body section of covering for heat sinks. Consequently, a refrigerant fluid can be easily led to an introductory hole.

[Translation done.]

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TECHNICAL FIELD

[Field of the Invention] This invention relates to covering for heat sinks prepared in the heat sink for increasing heat exchange area in various kinds of heat exchange devices, heat transfer units, etc.

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PRIOR ART

[Description of the Prior Art] For example, sources of generation of heat, such as CPU, are variously established in the interior of the case of computers, such as a personal computer. And in order to cool these sources of generation of heat efficiently, while preparing a heat sink in these sources of generation of heat, preparing outside the discharge fan who discharges air is conventionally performed to the case of a computer from the introductory hole which inhales air from the outside to the interior, and the interior. By computer which is such a configuration, by rotating a discharge fan, air is led to the interior of the case of a computer from an introductory hole, and the interior of a case of a computer is circulated. And the heat transmitted to the heat sink from the source of generation of heat is made to radiate heat from a heat sink to a recirculating air, and the case exterior of a computer is made to discharge the air heated by that cause by the discharge fan. Consequently, since air carries away the heat inside the case of a computer to the exterior as the sensible heat, the source of generation of heat inside a computer can be cooled.

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EFFECT OF THE INVENTION

[Effect of the Invention] Since the body section is equipped with the induction which forms the radiator of a heat sink for the body section in the shape of a wrap tunnel, and leads a refrigerant fluid to the interior of that body section according to covering for heat sinks of this invention as explained above, more refrigerant fluids can be sprayed on the radiator of the heat sink covered with covering for heat sinks. Therefore, without supplying new power from the outside, the heat release of a heat sink can be increased and the refrigeration capacity of a heat sink can be increased.
[0045] moreover -- as the induction which leads a refrigerant fluid to the interior of the body section of covering for heat sinks -- the outer wall section of the body section -- among those, the exterior of the body section of covering for heat sinks is flowed by preparing the introductory hole which penetrates external surface also to the part of the radiator of the heat sink located in the downstream in the passage of a refrigerant fluid -- the so-called fresh refrigerant fluid which is not heated can be sprayed. Consequently, the heat release of a heat sink can be increased further and the refrigeration capacity of a heat sink can be increased further.
[0046] Furthermore, the elementary stream of the refrigerant fluid which flows the exterior of the body section can be compulsorily turned to an introductory hole by preparing the introductory hole which penetrates the inside-and-outside side in the outer wall section of the body section, and the fluid guide plate made to protrude on the external surface of the body section as induction which leads a refrigerant fluid to the interior of the body section of covering for heat sinks. Consequently, a refrigerant fluid can be easily led to an introductory hole.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, it is in the inclination for those calorific value to also increase as high performance-ization of the computer component represented by CPU progresses. Therefore, in heat dissipation by the heat sink, the limitation was in refrigeration capacity. Therefore, when the heat beyond the limitation of the refrigeration capacity occurred with the computer component, the temperature rise of the computer component may have become remarkable, and **** actuation and burning may have been caused at last.
[0004] It is possible to increase refrigeration capacity by on the other hand increasing the ventilation capacity of the fan who generates a recirculating air inside the case of a computer. However, there is a limitation in increasing the ventilation capacity by increasing a fan's rotational frequency. Moreover, even if it enlarges a fan's path, there is a limitation in enlarging a fan's path in the case where the fan is prepared in the so-called portable personal computer represented by the personal computer of a notebook mold. Furthermore, though a fan's rotational frequency and its path were increased and a fan's ventilation capacity was increased, increase of power consumption and increase of the noise may have been caused.
[0005] It aims at offering covering for heat sinks which can increase the refrigeration capacity of a heat sink, without this invention making the above-mentioned situation a background, making it, and newly supplying power from the outside.

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OPERATION

[Means for Solving the Problem and its Function] In order to attain the above-mentioned purpose, invention indicated to claim 1 The periphery side of the heat sink equipped with the radiator which is arranged in the passage of a refrigerant fluid and radiates heat between the refrigerant fluid is set to covering for wrap heat sinks. It is characterized by having the body section of the shape of a tunnel which has opening which covered the periphery side of said radiator and carried out opening towards the upstream of the passage of said refrigerant fluid, and the induction which leads said refrigerant fluid to the interior of the body section.
[0007] Therefore, in invention of claim 1, the radiator of a heat sink is formed for the body section in the shape of a wrap tunnel, and since the body section is equipped with the induction which leads a refrigerant fluid to the interior of the body section, more refrigerant fluids can be sprayed on the radiator of the heat sink covered with covering for heat sinks. Therefore, without supplying new power from the outside, the heat release of a heat sink can be increased and the refrigeration capacity of a heat sink can be increased.
[0008] Moreover, invention indicated to claim 2 is characterized by being the introductory hole which said induction penetrates to the inside-and-outside side formed in said body section.
[0009] In invention of claim 2, as induction which leads a refrigerant fluid to the interior of the body section of covering for heat sinks, in the outer wall section of the body section therefore, among those, by preparing the introductory hole which penetrates external surface the exterior of the body section of covering for heat sinks is flowed also to the part of the radiator of the heat sink located in the downstream in the passage of a refrigerant fluid -- the so-called fresh refrigerant fluid which is not heated can be sprayed. Consequently, the heat release of a heat sink can be increased further and the refrigeration capacity of a heat sink can be increased further.
[0010] Furthermore, invention indicated to claim 3 is characterized by consisting of a fluid guide plate by which said induction protrudes on the introductory hole formed in the inside-and-outside side of said body section by penetrating, and the external surface of said body section, and turns and leads the refrigerant fluid of the exterior of said body section to said introductory hole.
[0011] Therefore, in invention of claim 3, the elementary stream of the refrigerant fluid which flows the exterior of the body section can be compulsorily turned to an introductory hole by preparing the introductory hole which penetrates the inside-and-outside side in the outer wall section of the body section, and the fluid guide plate made to protrude on the external surface of the body section as induction which leads a refrigerant fluid to the interior of the body section of covering for heat sinks. Consequently, a refrigerant fluid can be easily led to an introductory hole.
[0012]
[Embodiment of the Invention] Below, the example of this invention is explained based on a drawing. An example of covering for heat sinks in this invention is shown in drawing 1 . The covering 1 for heat sinks shown here is the member of the shape of a cube type tunnel whose cross section it is a product made from aluminum (aluminum), and is a rectangle. If it explains to a detail more, this covering 1 for heat sinks consists of flanges 4 to which the medial surface which the side plate 3 of the rectangle plate-

like right and left perpendicularly prolonged from the two sides which counter among the four sides of a rectangle plate-like a top plate 2 and a top plate 2, and the top plate 2 of each side plate 3 counter mutually in the lower limit section of the opposite side protruded on the right angle in the opposite direction. In addition, the body section 5 consists of a top plate 2 and a side plate 3.
[0013] And the introductory hole 6 which the top plate 2 was made to penetrate so that opening of the front flesh side may be carried out to both-sides side is formed. In the example of drawing 1 , said side plate 3 is a slit-like hole from the side edge section to [while is prolonged and] the side edge section of another side, sets fixed spacing in parallel mutually, and these introductory holes 6 are formed. Moreover, while meets the longitudinal direction of each introductory hole 6 in the top face in drawing 1 of a top plate 2, and the fluid guide plate 7 is formed in the edge, respectively. These fluid guide plates 7 are for leading cooling media, such as air which flows the exterior of the covering 1 for heat sinks, to the introductory hole 6, and they are projected and prepared in the top face of a top plate 2 so that the include angle with the effective area of the introductory hole 6 to make may serve as an acute angle. In addition, the introductory hole 6 and the fluid guide plate 7 constitute induction 8. Drawing 2 is a sectional view to show the relative position of the introductory hole 6 and the fluid guide plate 7.
[0014] An example of the heat sink to which the above-mentioned covering 1 for heat sinks is joined is shown in drawing 3 . The heat sink 11 shown here is metal made from aluminum (aluminum), copper (Cu) or those alloys, etc., and consists of the plate-like base 12 and a fin 13 of the shape of sheet metal which is the radiator formed two or more sheets in the state of standing up from the base 12. In addition, the fin 13 is formed so that the height of a fin 13 may become below the sum of the height of the side plate 3 of the covering 1 for heat sinks, and the thickness of a flange 4, i.e., the inside distance in the height direction in drawing 1 of the covering 1 for heat sinks.
[0015] The condition that the covering 1 for heat sinks was joined to the heat sink 11 is shown in drawing 4 . The covering 1 for heat sinks is joined to the heat sink 11 so that the side plate 3 of the covering 1 for heat sinks may become parallel to the fin 13 of a heat sink 11, and so that a fin 13 may be fitted in the interior of the body section 5 of the covering 1 for heat sinks. In addition, the covering 1 for heat sinks is joined to the heat sink 11 by welding, pasting up or ****ing and carrying out the stop of the flange 4 of the covering 1 for heat sinks to the base 12 of a heat sink 11. And a chamber 14 is formed from the base 12 of a heat sink 11, the top plate 2 of the covering 1 for heat sinks, and a side plate 3. Therefore, the chamber 14 is the thing of the shape of a tunnel equipped with the opening 15 which carries out opening by the edge side of a fin 13.
[0016] Next, the example which attached in CPU (arithmetic and program control) of a book type personal computer the heat sink 11 to which the covering 1 for heat sinks was joined is shown. The body 22 of a personal computer consists of a rectangle container with comparatively thin thickness formed by metal panels, such as a plastics panel or a Magnesium alloy, almost like what was known conventionally, and the book type personal computer 21 shown in drawing 5 is making the magnitude of A5 in JIS (Japanese Industrial Standards) - A4 size extent. And the keyboard 23 is attached in the top-face section of the body 22 of a personal computer by means, such as insertion. Furthermore, the display 24 is attached in the body 22 of a personal computer rotatable centering on the rotation shaft in the end section of the body 22 of a personal computer.
[0017] Moreover, CPU25 which is a source of generation of heat is formed in the base inside the body 22 of a personal computer. And as shown in drawing 6 , the air breathing hole 27 and the air discharge fan 28 are formed in one of the side-attachment-wall sections 26 of the body 22 of a personal computer. And it is formed so that the passage of the air which is adopted from the air breathing hole 27, and is discharged by the air discharge fan 28 may pass CPU25.
[0018] Furthermore, the heat pipe 31 is attached in the top face of CPU25 possible [heat transfer]. As shown in drawing 7 , this heat pipe 31 is equipped with the container 32 of the shape of hollow flat [metal]. This container 32 is isolated so that it may counter with the heating unit 33 with a square field, and this heating unit 33, and it is constituted by the four inclination side-attachment-wall sections 35 with the trapezoid field which connects the radiator 34 with the field of a square with an area larger than that heating unit 33, and the neighborhood of these heating units 33 and the neighborhood of a radiator

34, respectively. In addition, the heating unit 33 of a heat pipe 31 is attached possible [CPU25 and heat transfer]. Furthermore, the working fluid which is not illustrated is enclosed with the interior of a container 32.

[0019] Moreover, drawing 8 is the top view of the heat pipe 31 in the condition of having removed the radiator 34. The wick 36 which consists of a groove is formed in the inside of a heating unit 33, and the inside of the four inclination side-attachment-wall sections 35. By the heating unit 33, this wick 36 is arranged in the shape of a grid, and it is arranged so that a radiator 34 and a heating unit 33 may be connected with the inclination side-attachment-wall section 35 in a straight line. This wick 36 makes the operation which makes the working fluid of the liquid phase flow back from a radiator 34 to a heating unit 33 according to the capillary tube force.

[0020] And the base 12 of a heat sink 11 sticks the base to the radiator 34 of the heat pipe 31, and is attached in it possible [heat transfer]. In addition, the sense of the covering 1 for heat sinks attached in a heat sink 11 and this is set as the sense which a fin 13 becomes almost parallel to the elementary stream of the air which is a refrigerant fluid, and the fluid guide plate 7 concentrates towards the upstream of the airstream.

[0021] And an operation of this invention constituted as mentioned above is explained. If a book type personal computer 21 operates, CPU25 will operate and generate heat. And the generated heat is transmitted to the heating unit 33 of a heat pipe 31. Furthermore, with the heat, the working fluid which exists in a heating unit 33 and which is not illustrated is heated, and it evaporates. It condenses, after the working fluid which evaporated flows to a radiator 34 and radiates heat there. And the condensed working fluid flows back to a heating unit 33 by dropping or the wick 36 to the direct heating unit 33.

[0022] Moreover, the heat transmitted to the radiator 34 of a heat pipe 31 is transmitted to the base 12 of a heat sink 11, and the part is further transmitted to a fin 13 or the covering 1 for heat sinks. And the heat transmitted to the base 12, a fin 13, or the covering 1 for heat sinks radiates heat to the air which flows near a heat sink 11 or the covering 1 for heat sinks from there.

[0023] By the way, the air which flows the interior of the body 22 of a personal computer as a refrigerant fluid is adopted by the air discharge fan 28 from the air breathing hole 27, and flows near the heat sink 11 by him. And heat is taken from a heat sink 11 or the covering 1 for heat sinks, and it is discharged by the air discharge fan 28.

[0024] Drawing 9 is a sectional view in a direction parallel to the fin 13 of CPU25, a heat pipe 31, a heat sink 11, and the covering 1 for heat sinks. A part of the air which has flowed towards a heat sink 11 flows into a chamber 14 from opening 15. Moreover, the part is guided to the introductory hole 6 by the fluid guide plate 7, and the air which flows the upper part in drawing 9 rather than the top plate 2 of the covering 1 for heat sinks flows into a chamber 14 from the introductory hole 6 compulsorily.

[0025] Thus, the air which is a refrigerant fluid can be made to flow into a chamber 14 more mostly as compared with the case where they are not prepared, by forming the introductory hole 6 and the fluid guide plate 7 in the covering 1 for heat sinks. Consequently, since the amount of the air which flows near the fin 13 which is a heat dissipation means increases, even if it does not supply new power from the outside, the heat release of a heat sink 11 can be increased. That is, the refrigeration capacity of a heat sink 11 can be increased. If it puts in another way, since the amount of the air with which flows the part distant from the heat sink 11, and the business of cooling is not presented can be lessened, the cooling effectiveness as the whole equipment can be raised.

[0026] Moreover, when not forming the introductory hole 6 and the fluid guide plate 7 near the part of the fin 13 located in the downstream in the passage of air, the air heated by radiating heat from the part of the fin 13 located in the upstream in the passage of air rather than the part is flowing. Therefore, in the part of the fin 13 located in the downstream in the passage of air, when a temperature gradient with surrounding air becomes small, heat release becomes less than the heat release of the part of a fin 13 located in the upstream in the passage of air rather than the part. However, since the so-called fresh air which is flowing the exterior of the body section 5 of the covering 1 for heat sinks and which is not heated can be sprayed also to the part of the fin 13 located in the downstream in the passage of air by preparing the above-mentioned introductory hole 6 and the above-mentioned fluid guide plate 7, the heat

release of a heat sink 11 can be increased further. Consequently, the refrigeration capacity of a heat sink 11 can be increased further.

[0027] Drawing 10 shows other examples of this invention. In addition, the number same to the member which is the same configuration as an above-mentioned example as an above-mentioned example is attached, and the explanation is omitted. The covering 41 for heat sinks shown in drawing 10 has the configuration as the body section 5 of the covering 1 for heat sinks and the flange 4 which are shown in drawing 1 with the respectively same body section 42 and flange 43.

[0028] Moreover, two or more introductory holes 45 of the shape of an ellipse made to penetrate as induction 44 of the covering 41 for heat sinks so that opening may be carried out to both-sides side of a top plate 2 are formed. In addition, the introductory hole 45 is formed in the direction of a major axis in the two condition that the major axis becomes the side of a top plate 2 and parallel to which a side plate 3 extends. Moreover, in the direction of a minor axis, only the width of face of the gap of the fin 13 of a heat sink 11 sets spacing, and the introductory hole 45 is formed.

[0029] Furthermore, the covering 41 for heat sinks is joined to the heat sink 11 so that a fin 13 may be fitted in the interior of the body section 42 of the covering 41 for heat sinks, and so that [so that the side plate 3 of the covering 41 for heat sinks may become parallel to the fin 13 of a heat sink 11, and] the gap of a fin 13 may be located under the introductory hole 45. And a chamber 46 is formed from the base 12 of a heat sink 11, the top plate 2 of the covering 41 for heat sinks, and a side plate 3. Therefore, the chamber 46 is the thing of the shape of a tunnel equipped with the opening 47 which carries out opening by the edge side of a fin 13.

[0030] Next, the example which attached in CPU25 of a book type personal computer 21 the heat sink 11 to which the covering 41 for heat sinks was joined is shown. As shown in drawing 11 , the air discharge fan 28 is formed in one of the side-attachment-wall sections 26 of the body 22 of a personal computer close to CPU25, and the air breathing hole 27 is formed in the two side-attachment-wall sections 26 which adjoin one of the side-attachment-wall section 26 of the, respectively. And it is formed so that the passage of the air which is adopted from the air breathing hole 27, and is discharged by the air discharge fan 28 may pass CPU25.

[0031] In addition, the heat pipe 31 is attached in the top face of CPU25 possible [heat transfer] like the above-mentioned example. And the base 12 of a heat sink 11 sticks the base to the radiator 34 of the heat pipe 31, and is attached in it possible [heat transfer]. Moreover, the duct 48 which opens a chamber 46 and the air discharge fan 28 for free passage is formed.

[0032] And an operation of this invention constituted as mentioned above is explained. Since the process in which the heat generated from CPU25 is transmitted to the radiator 34 of a heat pipe 31 is the same as an above-mentioned example, explanation is omitted. The heat transmitted to the radiator 34 of a heat pipe 31 is transmitted to the base 12 of a heat sink 11, and the part is further transmitted to a fin 13 or the covering 41 for heat sinks. And the heat transmitted to the base 12, a fin 13, or the covering 41 for heat sinks radiates heat to the air which flows near a heat sink 11 or the covering 41 for heat sinks from there.

[0033] By the way, the air which flows the interior of the body 22 of a personal computer as a refrigerant fluid is adopted by the air discharge fan 28 from the air breathing hole 27, and flows near the heat sink 11 by him. And heat is taken from a heat sink 11 or the covering 41 for heat sinks, and it is discharged by the air discharge fan 28 through a duct 48.

[0034] Drawing 12 is a sectional view in a direction parallel to the fin 13 of CPU25, a heat pipe 31, a heat sink 11, the covering 41 for heat sinks, and a duct 48. A part of the air which has flowed towards a heat sink 11 flows into a chamber 46 from opening 47. Moreover, since the atmospheric pressure inside a chamber 46 becomes smaller than the atmospheric pressure of the exterior when the air discharge fan 28 rotates, the air which flows the upper part rather than the top plate 2 of the covering 41 for heat sinks is inhaled from the introductory hole 45, and flows into a chamber 46.

[0035] Thus, the air which is a refrigerant fluid can be made to flow into a chamber 46 more mostly as compared with the case where the introductory hole 45 is not formed, by forming the introductory hole 45 in the covering 41 for heat sinks, and making the atmospheric pressure of the chamber 46 interior

small. Consequently, since the amount of the air which flows near the fin 13 which is a heat dissipation means increases, even if it does not supply new power from the outside, the heat release of a heat sink 11 can be increased. That is, the refrigeration capacity of a heat sink 11 can be increased. If it puts in another way, since the amount of the air with which flows the part distant from the heat sink 11, and the business of cooling is not presented can be lessened, the cooling effectiveness as the whole equipment can be raised.

[0036] Moreover, when not forming the introductory hole 45 near the part of the fin 13 located in the downstream in the passage of air, the air heated by radiating heat from the part of the fin 13 located in the upstream in the passage of air rather than the part is flowing. Therefore, in the part of the fin 13 located in the downstream in the passage of air, when a temperature gradient with surrounding air becomes small, heat release becomes less than the heat release of the part of a fin 13 located in the upstream in the passage of air rather than the part. However, since the so-called fresh air which is flowing the exterior of the body section 42 of the covering 41 for heat sinks and which is not heated can be sprayed also to the part of the fin 13 located in the downstream in the passage of air by forming the above-mentioned introductory hole 45 and making the atmospheric pressure inside a chamber 46 smaller than the atmospheric pressure of the exterior, the heat release of a heat sink 11 can be increased further. Consequently, the refrigeration capacity of a heat sink 11 can be increased further.

[0037] in addition, by each above-mentioned example, the air which is the refrigerant fluid which flows the upper part of covering for heat sinks as a means to make the interior of the chamber formed with covering for heat sinks, and a heat sink flow Although the example which prepares an introductory hole and a fluid guide plate, and the example which makes the atmospheric pressure inside a chamber smaller than the atmospheric pressure of the exterior while preparing an introductory hole were shown This invention is not limited to this and may make the air which flows the exterior of covering for heat sinks flow inside a chamber by using other means.

[0038] Moreover, although the introductory hole and fluid guide plate which are a means to introduce in a chamber the air which is a refrigerant fluid were prepared in the top plate of covering for heat sinks by each above-mentioned example, this invention is not limited to this and may be prepared in the side plate of covering for heat sinks.

[0039] Furthermore, by each above-mentioned example, although aluminum (aluminum) was used as the quality of the material of covering for heat sinks, this invention is not limited to this but can also use the synthetic resin which metals, such as copper (Cu), are sufficient as, and has thermal resistance.

[0040] And although the thing of the shape of a cube type tunnel whose cross section is a rectangle as a configuration of covering for heat sinks was used by each above-mentioned example, this invention may not be limited to this but the thing of the shape of a cube type tunnel whose thing and cross section of the shape of a cube type tunnel whose cross section is a hemicycle are a triangle may be used for it. Moreover, a tubing-like thing may be used.

[0041] Moreover, although air was used as a refrigerant fluid by each above-mentioned example, this invention may not be limited to this, other gases are sufficient as it, and a liquid is sufficient as it.

[0042] Furthermore, although what was equipped with the sheet metal-like fin as a heat sink was used by each above-mentioned example, this invention is not limited to this and can adopt a corrugated fin etc.

[0043] And although covering for heat sinks of this invention was used for the heat sink which cools CPU of a personal computer by each above-mentioned example, this invention is not limited to this, can be used also for heating elements other than CPU inside a personal computer, and can be further used also for the heating element of the interior, such as a workstation and a server.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the perspective view showing one example of covering for heat sinks of this invention.
[Drawing 2] It is the sectional view of the covering for heat sinks.
[Drawing 3] It is the perspective view showing a heat sink.
[Drawing 4] It is the perspective view showing the heat sink to which covering for heat sinks was joined.
[Drawing 5] It is the mimetic diagram showing a book type personal computer.
[Drawing 6] It is the top view.
[Drawing 7] It is the perspective view showing a heat pipe.
[Drawing 8] It is the top view.
[Drawing 9] It is the sectional view showing CPU, a heat pipe, a heat sink, and covering for heat sinks.
[Drawing 10] It is the perspective view showing other examples of covering for heat sinks of this invention.
[Drawing 11] It is the top view showing a book type personal computer.
[Drawing 12] It is the sectional view showing CPU, a heat pipe, a heat sink, and covering for heat sinks.
[Description of Notations]
1 41 -- Covering for heat sinks 2 -- Top plate 5 42 -- Body section, 6 45 -- Introductory hole 7 -- Fluid guide plate 8 44 -- Induction, 11 -- Heat sink 13 -- Fin 14 46 -- Chamber, 15 47 -- Opening 21 -- Book type personal computer 22 -- Body of a personal computer 25 -- CPU 27 -- Air breathing hole 28 -- Air discharge fan 31 -- Heat pipe 48 -- Duct.

[Translation done.]

* NOTICES *

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2.**** shows the word which can not be translated.
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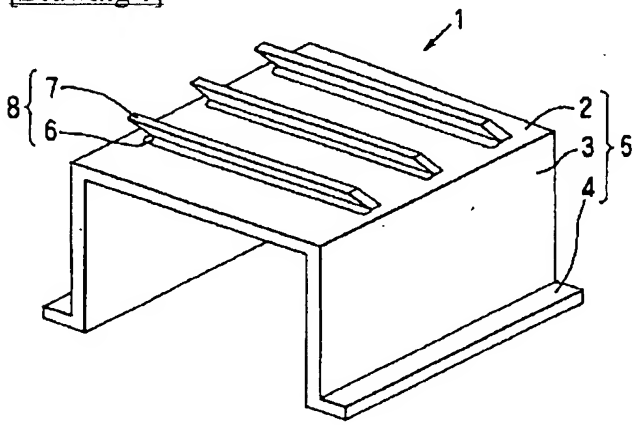
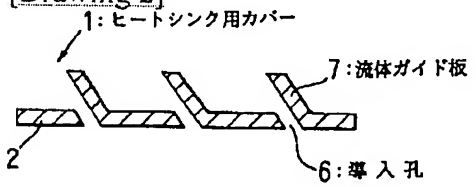
DRAWINGS

[Drawing 1]

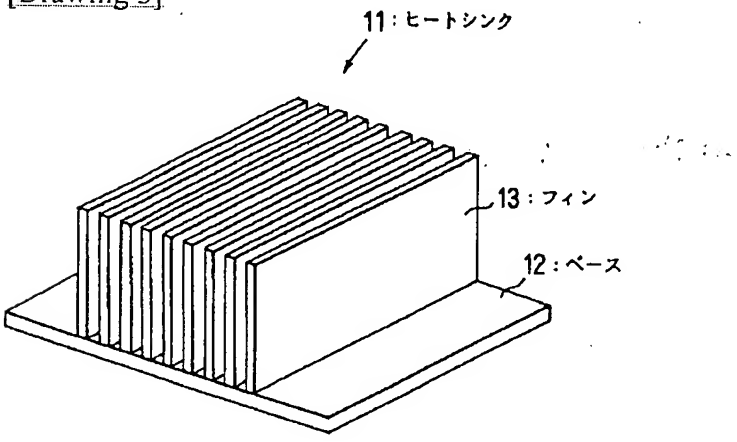


1：ヒートシンク用カバー　7：流体ガイド板
5：本体部　8：導入部
6：導入孔

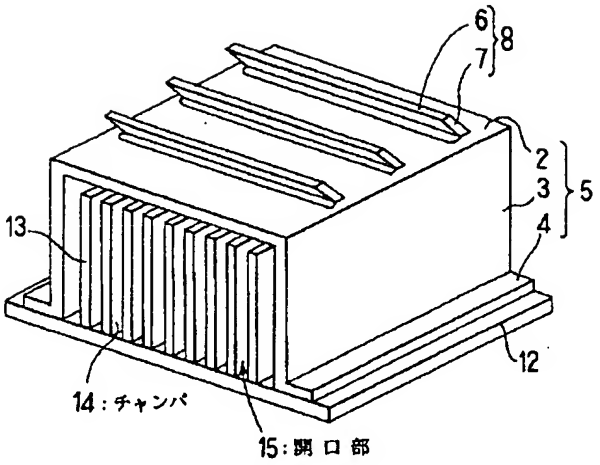
[Drawing 2]



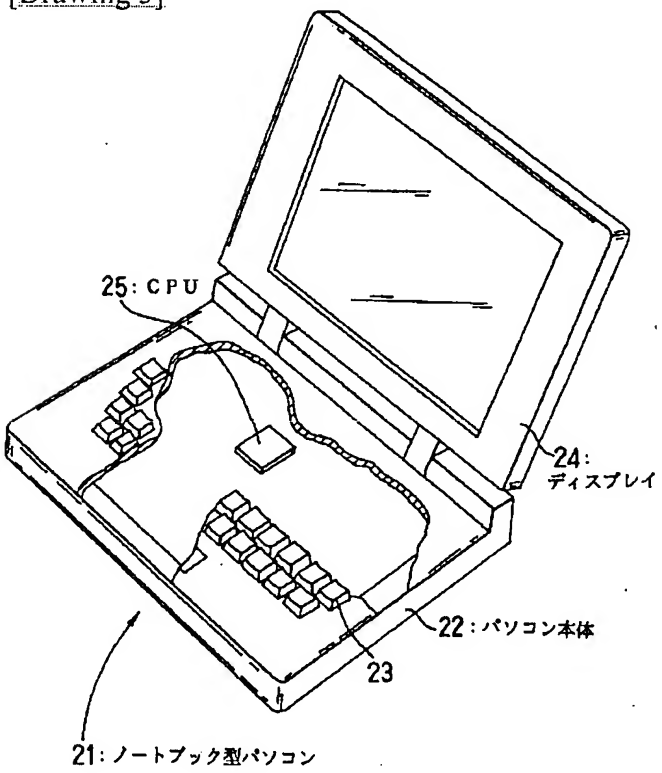
[Drawing 3]



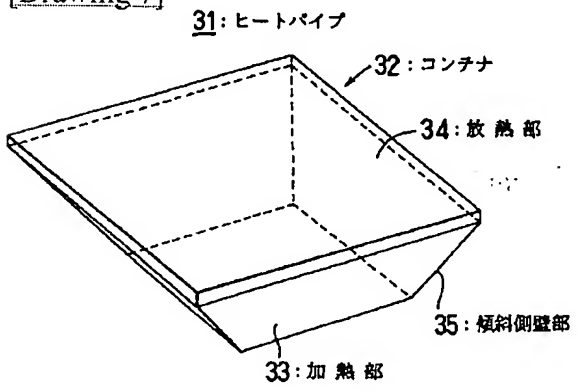
[Drawing 4]



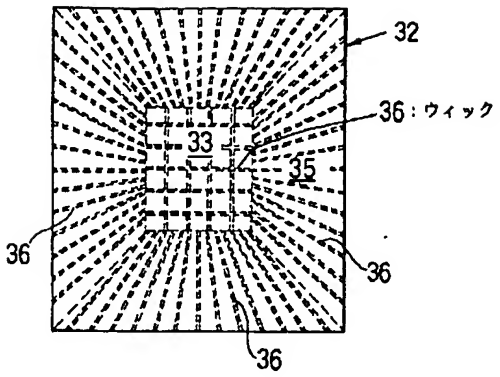
[Drawing 5]



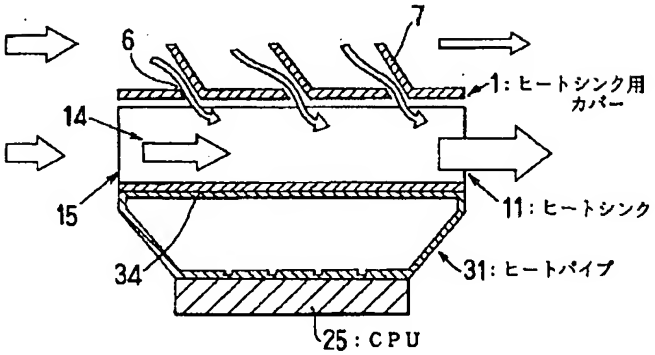
[Drawing 7]



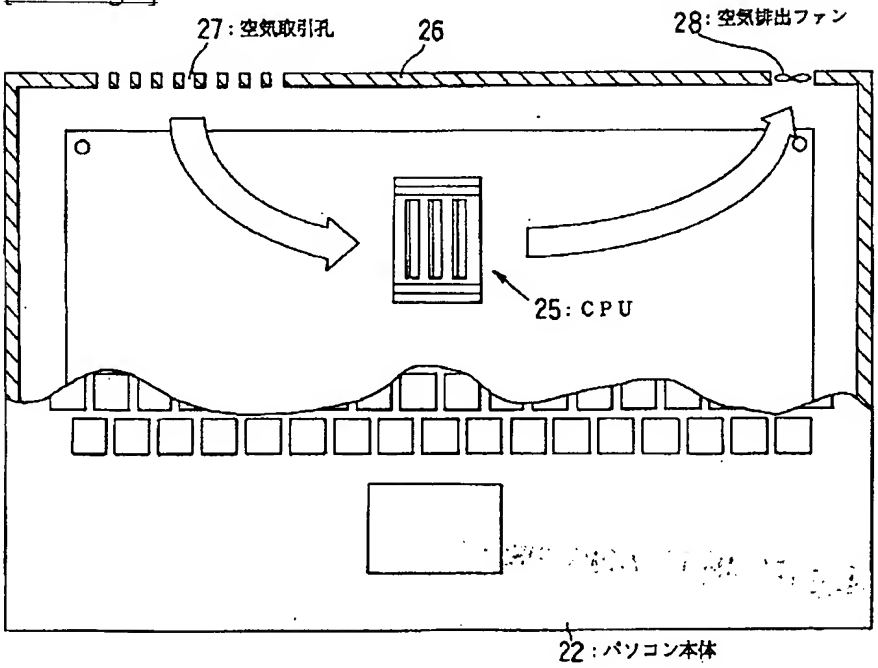
[Drawing 8]



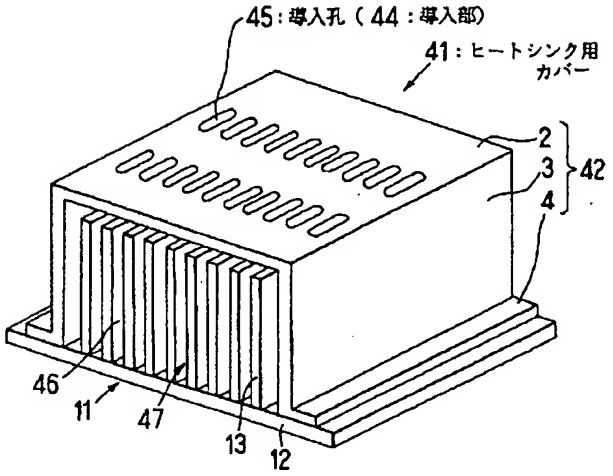
[Drawing 9]



[Drawing 6]

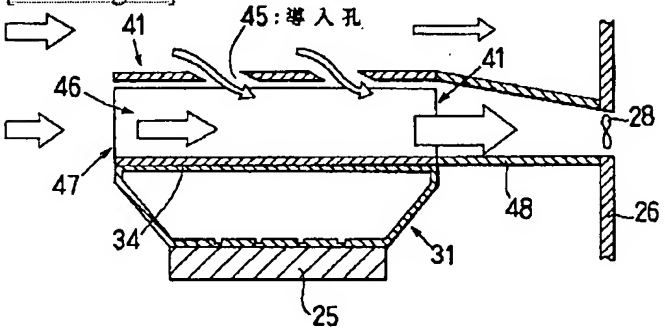


[Drawing 10]

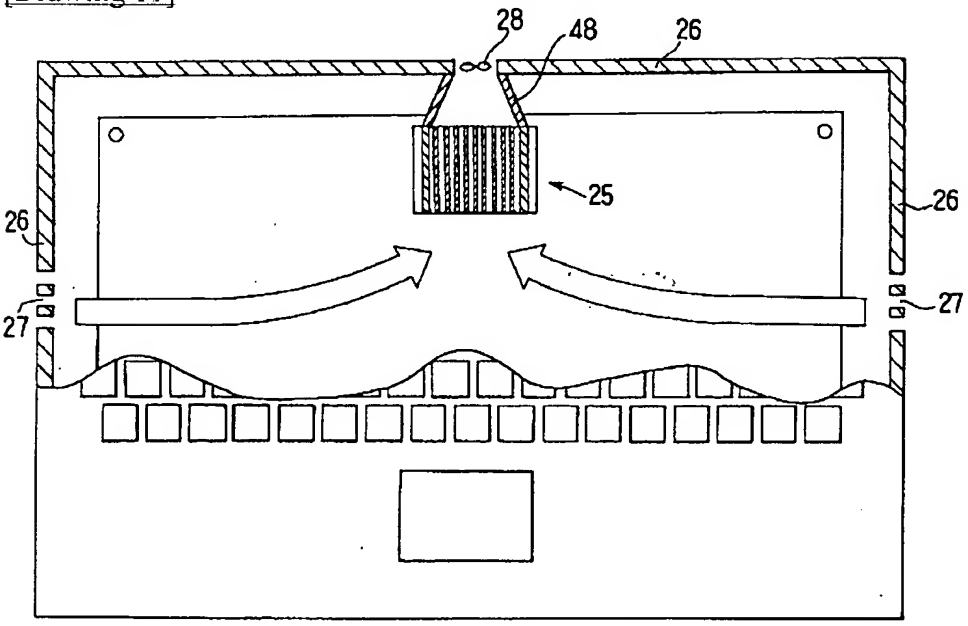


11：ヒートシンク　46：チャンバ　47：開口部

[Drawing 12]



[Drawing 11]



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